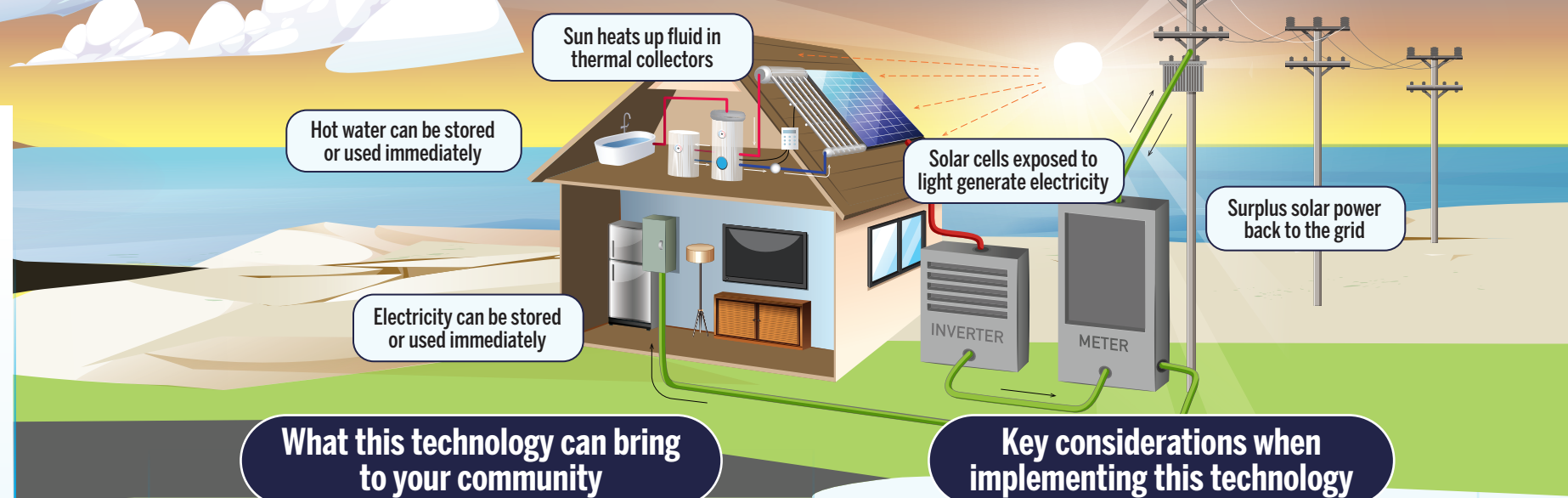


## How does solar energy work?

There are two types of solar energy systems:

- A **photovoltaic (PV) system** is made up of many solar cells linked together to form panels that are ground-mounted or installed on roofs and other structures. The PV panels will generate electricity when their solar cells are exposed to light. The electricity can be used right away to provide power or stored in batteries for later use.
- **Solar thermal collectors** have fluid (liquid or air) flowing through them. The sun heats up the fluid, which can be used immediately for local hot water and air heating in a single building or stored for later use.



For an abundant source of clean energy, simply look up to the sky. Solar energy systems take the sun's power and turn it into heat or electricity – and even in cold climates, it's one of the least expensive renewable energy technologies available. By adding solar energy to their heating and electricity generation mix, Northern and remote communities can reduce their use of diesel and help decrease carbon emissions.

Cost of solar energy<sup>1,2</sup>:  
(solar photovoltaic)

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## What this technology can bring to your community

- Even in very cold climates, the sun still shines – meaning solar energy is a viable option even in the Arctic.
- Solar energy systems can easily be installed in many different sizes: from a single home to facilities helping power communities.
- Assessments for solar are less complicated and therefore less costly than other energy projects. It's also relatively easy to predict how much sun your community gets throughout the year.
- Solar PV systems can be integrated with diesel generators as part of a hybrid energy system, helping you reduce diesel fuel consumption.
- In addition to reducing your electricity costs, you can sell surplus solar power back to the grid (if local infrastructure and feed-in-tariff<sup>3</sup> or independent power producer<sup>4</sup> programs exist).
- A PV system is easily scalable. You can start with a small system and add more panels later.

## Key considerations when implementing this technology

- Because sunlight is variable, most solar energy systems need to be combined with an energy storage system, like a battery bank (for PV) or hot water tank (for solar thermal).
- PV panels and collectors must be unshaded and cleared of dust and snow to work efficiently.
- Specialized solar thermal collectors are available that work in extremely cold climates, even when half-covered in snow.
- Solar energy system components are easier to transport to remote areas than other renewables, but still require local expertise to properly install and maintain.
- Solar energy systems need an inverter to convert direct current (DC) to alternating current (AC) electricity so it can be used by appliances.
- Bifacial (two-sided) PV panels can capture solar energy reflected from snow-covered ground.

## Solar energy

## Transforming heat and power in Northern and remote communities

**The bottom line** Solar is a reliable, easy-to-install energy solution with the potential to provide major cost savings to Northern and remote communities, without the environmental impacts of carbon-emitting diesel fuel or heating oil.

## Want to learn more?

For more information, please send us an email:  
[oerdremoteenergy-energieadistancebrde@nrcan-rncan.gc.ca](mailto:oerdremoteenergy-energieadistancebrde@nrcan-rncan.gc.ca)

<sup>1</sup> The levelized cost of electricity (LCOE) measures the lifetime costs of running an energy source divided by how much energy it produces over that span (typically in megawatt-hours).

<sup>2</sup> Estimated range of LCOE in Canada for solar PV (\$150–\$350/MWh) according to the Canadian Energy Regulator. (2022). Canada's Adoption of Renewable Power Sources – Energy Market Analysis. <https://www.cer-rec.gc.ca/en/data-analysis/energy-commodities/electricity/report/archive/2017-canadian-adoption-renewable-power/canadas-adoption-renewable-power-sources-energy-market-analysis-costs-trade-offs.html>. Additional costs may apply depending on location.

<sup>3</sup> A feed-in-tariff provides owners of renewable energy systems with a fixed financial incentive for producing electricity that is fed into the local grid.

<sup>4</sup> An independent power producer (IPP) is a person or company that generates and sells renewable electricity directly to the electric utility.



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